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# HLW Facility Waste Removal Capability

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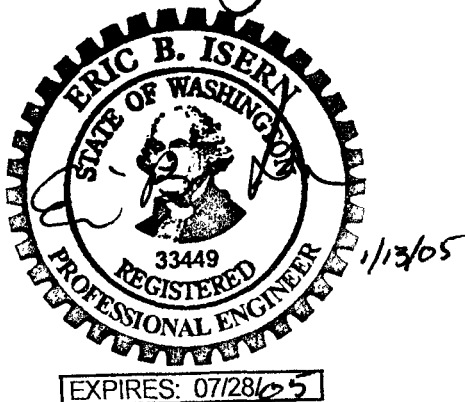
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## History Sheet

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## Acronyms

AEA	Atomic Energy Act of 1954
BNI	Bechtel National, Inc.
DWP	Dangerous Waste Permit
HCP	HLW concentrate receipt process system
HDH	HLW canister decontamination system
HEME	high efficiency mist eliminator
HFP	HLW melter feed process system
HLW	high-level waste
HOP	melter offgas treatment process system
HPH	HLW canister pour handling system
HSB	HLW melter cave support handling system
RLD	radioactive liquid waste disposal system
SBS	submerged bed scrubber
TK	tank
VSL	Vessel
WAC	<i>Washington Administrative code</i>

# 1 Summary

The High Level Waste (HLW) facility must satisfy the waste removal criteria of Washington Administrative Code (WAC) 173-303-640(4) and Dangerous Waste Permit (DWP) Number WA7890008967, Permit Condition III.10.E.9.e.iii and III.10.J.5.e.iii for HLW vitrification facility Sub-systems and tanks, hereafter called regulated plant items, secondary containment areas. This report evaluates the capability for removing, within 24 hours, leaked waste that may accumulate within the regulated secondary containment areas in the HLW facility.

The secondary containment areas located at different elevations of the HLW facility are provided with sumps. These sumps are lined with 6 % molybdenum stainless steel liner material and equipped with radar or bubbler-type level detectors and have either ejectors or pumps.

Waste removal capability is estimated for the regulated plant items secondary containment areas listed as follows:

1. Wet Process Cell - South (Room H-B014) / -21 Ft Elevation  
The flooding volume in this area includes the total volume of the largest vessel (one of the HLW Concentrate Receipt Vessels, HCP-VSL-00001/ 00002 \*). There are no fire sprinklers provided in this cell.  
  
\* Note: The HLW Concentrate Receipt Vessels have been deleted from design, however, for the purpose of this report these vessels represent bounding volume consideration for this cell.
2. Wet Process Cell - North (Room H-B014) / -21 Ft Elevation  
The flooding volume in this area includes the total volume of the Offgas Drains Collection Vessel (RLD-VSL-00002). This cell has no fire protection sprinklers.
3. Canister Decon Cave (Room H-B035) / -16 Ft Elevation  
The flooding volume in this area includes 110 % of the maximum operating volume of the Waste Neutralization Vessel (HDH-VSL-00003). This room has no fire protection sprinklers.
4. Canister Rinse Tunnel (Room H-B039B) / -16.5 Ft Elevation  
The flooding volume in this area includes 110 % of the maximum operating volume of the Rinse Tunnel Canister Rinse Vessel (HDH-VSL-00001) and a firewater volume.
5. Canister Rinse-Bogie Maintenance (Room H-B039A) / -16 Ft Elevation  
The flooding volume in this area includes 110 % of the maximum operating volume of the Rinse Tunnel Canister Rinse Vessel (HDH-VSL-00001) and a firewater volume.
6. SBS Drain Collection Cell No 1 (Room H-B021) / -21 Ft Elevation  
The flooding volume in this area includes 110 % of the maximum operating volume of SBS Condensate Receiver Vessel (HOP-VSL-00903). This room has no fire protection sprinklers.
7. SBS Drain Collection Cell No 2 (Room H-B005) / -21 Ft Elevation  
The flooding volume in this area includes 110 % of the maximum operating volume of SBS Condensate Receiver Vessel (HOP-VSL-00904). This room has no fire protection sprinklers.

8. Melter Cave No 1 - South (Room H-0117) / 3 Ft Elevation  
The flooding volume in this area includes 110 % of the maximum operating volume of the Melter 1 Feed Vessel (HFP-VSL-00002). This room has no fire protection sprinklers.
9. Melter 1 Equipment Decontamination Pit (Room H-0310A) / 0 Ft Elevation  
The flooding volume in this area includes 110 % of the maximum operating volume of Decontamination Tank Melter Cave 1 (HSH-TK-00001). This room has no fire protection sprinklers.
10. Melter Cave No 2 - South (Room H-0106) / 3 Ft Elevation  
The flooding volume in this area includes 110 % of the maximum operating volume of the Melter 2 Feed Vessel (HFP-VSL-00006). This room has no fire protection sprinklers.
11. Melter 2 Equipment Decontamination Pit (Room H-0304A) / 0 Ft Elevation  
The flooding volume in this area includes 110 % of the maximum operating volume of Decontamination Tank Melter Cave 2 (HSH-TK-00002). This room has no fire protection sprinklers.

The results of the evaluation of waste removal capacity for each of the secondary containment areas is summarized as follows:

1. Wet Process Cell - South (Room H-B014) / -21 Ft Elevation  
Waste removal is achieved by the operation of one steam ejector in sump HCP-SUMP-00001.  
Total containment area waste removal capability is 14.0 hours.
2. Wet Process Cell - North (Room H-B014) / -21 Ft Elevation  
Waste removal is achieved by the operation of one steam ejector in sump RLD-SUMP-00001.  
Total containment area waste removal capability is 0.2 hours.
3. Canister Decon Cave (Room H-B035) / -16 Ft Elevation  
Waste removal is achieved by the operation of one steam ejector in sump HDH-SUMP-00003.  
Total containment area waste removal capability is 3.8 hours.
4. Canister Rinse Tunnel (Room H-B039B) / -16.5 Ft Elevation  
Waste removal is achieved by the operation of one steam ejector in sump HDH-SUMP-00001.  
Total containment area waste removal capability is 4.3 hours.
5. Canister Rinse-Bogie Maintenance (Room H-B039A) / -16 Ft Elevation  
Waste removal is achieved by the operation of one pump in sump HDH-SUMP-00002. Total containment area waste removal capability is 5.0 hours.
6. SBS Drain Collection Cell No 1 (Room H-B021) / -21 Ft Elevation  
Waste removal is achieved by the operation of one steam ejector in sump HOP-SUMP-00003.  
Total containment area waste removal capability is 7.7 hours.
7. SBS Drain Collection Cell No 2 (Room H-B005) / -21 Ft Elevation  
Waste removal is achieved by the operation of one steam ejector in sump HOP-SUMP-00008.  
Total containment area waste removal capability is 7.7 hours.
8. Melter Cave No 1 - South (Room H-0117) / 3 Ft Elevation

Waste removal is achieved by the operation of one steam ejector operating in sump HFP-SUMP-00002. Total containment area waste removal capability is 6.0 hours.

9. Melter 1 Equipment Decontamination Pit (Room H-0310A) / 0 Ft Elevation  
Waste removal is achieved by the operation of one steam ejector in sump HSH-SUMP-00008.  
Total containment area waste removal capability is 3.1 hours.
10. Melter Cave No 2 - South (Room H-0106) / 3 Ft Elevation  
Waste removal is achieved by the operation of one steam ejector in sump HFP-SUMP-00005.  
Total containment area waste removal capability is 6.0 hours.
11. Melter 2 Equipment Decontamination Pit (Room H-0304A) / 0 Ft Elevation  
Waste removal is achieved by the operation of one steam ejector in sump HSH-SUMP-00009.  
Total containment area waste removal capability is 3.1 hours.

These values range from 0.2 to 14.0 hours and are within the 24-hour period required by Chapter 173-303 WAC and stipulated by DWP Conditions III.10.E.9.e.iii and III.10.J.5.e.iii. These values are based on consideration of the maximum operating volume of a single vessel in its respective secondary containment area, plus the maximum anticipated volume of firewater (if applicable) that is postulated to accumulate in these cells and a design allowance of 5 % of flood volume to account for other auxiliary components (piping and equipment) in the room.

## **2 Objective**

The purpose of this report is to estimate and document the waste removal capabilities for the HLW facility secondary containment areas associated with regulated plant items.

The HLW Facility must satisfy the waste removal criteria of Chapter 173-303 WAC and DWP Conditions III.10.E.9.e.iii and III.10.J.5.e.iii for secondary containment systems. This report evaluates the capability for removing, within 24 hours, leaked waste that may accumulate within the regulated process cells within the facility.

Excluded from the scope of this report are:

- Secondary containment areas that do not include regulated plant items, such as Canister Handling Cave. The sumps located in Canister Handling Cave (Room H-0136), HPH-SUM-00001 and HPH-SUMP-00005, have not been included in the waste removal analysis because the Canister Handling Cave does not house regulated plant items but has only ancillary equipment (piping). However, each of these sumps is provided with an ejector, which is capable of removing 36,000 gallons of leaked waste over 24 hours period at the rate of 25 gpm.
- Secondary containment areas that house HLW melters, such as Central containment areas in Melter Cave 1 and 2. The sumps located in the Melter Cave - Central (Rooms H-0106 and H-0117), HSH-SUMP-00003 and HSH-SUMP-00007, have not been included in the waste removal analysis because the Melter Cave- Central does not house regulated plant items that contain liquids, but has only ancillary equipment (piping). However, each of these sumps is provided with an ejector, which is capable of removing 36,000 gallons of leaked waste over 24 hours period at the rate of 25 gpm.



### 3 Description

The regulatory requirements for the regulated plant items containment areas are included in WAC 173-303-640(4), Tank Systems, Containment and Detection of Releases (Reference 1). The regulatory requirements are stated as follows:

“(b) Secondary containment must be:

...designed or operated to drain and remove leaks, spills, or precipitation... from the secondary containment system within 24 hours or in as timely a manner as is possible ...”  
[WAC 173-303-640(4)(c)(iv)].

In addition, the Waste Treatment Plant DWP (Reference 2), Permit Conditions III.10.E.9.e.iii and III.10.J.5.e.iii require submittal of:

“Detailed operational plans and descriptions, demonstrating that spilled or leaked waste and accumulated liquids can be removed from the secondary containment system within twenty-four (24) hours.” [WAC 173-303-806(4)(c)(vii)].

### 4 Assumptions

Assumptions used in this evaluation of the HLW facility waste removal capabilities are listed as follows.

1. Nominal design flow rates for ejectors and sump pumps are used to estimate waste removal rates. Purchased equipment will have capacities equal to or exceeding the nominal design flow rates.
2. Operator response times needed for activating transfer ejectors or sump pumps or time required for manual alignment of valves and pump priming are negligible and ignored for the purposes of this evaluation.
3. The capacity to receive and store leaks removed from secondary containment areas is assumed to be available. Adequate space is available in PTF vessels to contain the total estimated flooding volume from a leak in RLD-VSL-00008. For postulated leaks from other tanks, adequate space is available in RLD-VSL-00008 to contain the total estimated flooding volume for a single event, or can be made available in RLD-VSL-00008 by pumping from it to PTF. Delays associated with drawing down liquid level in RLD-VSL-00008 to create adequate space, and delays associated with sampling, analysis, and waste neutralization prior to initiating waste transfers to PTF, are not considered. If the leak cannot be removed from the secondary containment areas within the 24 hours, Ecology will be notified and actions taken as required under the permit conditions III.10.E.5.j and III.10.J.1.a.xxiv.

### 5 Analysis

#### 5.1 Sumps Located at Elevation -21 Ft

The Wet Process Cell floor area (H-B014) is divided into two sections; the north and south. Each of these two sections is provided with a sump at -21 ft elevation.

### 5.1.1 Wet Process Cell South

The south section accommodates the Acidic Waste Vessel (RLD-VSL-00007) and Plant Wash and Drain Vessel (RLD-VSL-00008). The maximum flooding volume scenario is the failure of the largest vessel in the containment area. The Wet Process Cell (South) sump HCP-SUMP-00001 is provided with level detector and two emptying ejectors. The ejectors transfer the sump contents to Plant Wash and Drain Vessel (RLD-VSL-00008) or Pretreatment Facility (PTF). If the capacity of the Plant Wash and Drains Vessel (HLW-VSL-00008) is exceeded or failure of the vessel occurs, the excess flows into sump HCP-SUMP-00001. The redundant ejector transfers the waste to breakpot, RLD-BRKPT-00004, from where it is transferred by gravity to PTF. The maximum postulated flood considered is the total volume of one of the HLW Concentrate Receipt Vessels released to the containment. The HLW Concentrate Receipt Vessels have been deleted from design, however, for the purpose of this report, these vessels represent bounding volume consideration for this cell.

### 5.1.2 Wet Process Cell North

The Offgas Drain Collection Vessel (RLD-VSL-00002) is located in the north section of the Wet Process Cell. The postulated maximum flood volume is the total volume of this vessel. The Wet Process cell (North) sump RLD-SUMP-00001 is provided with level detector and two emptying ejectors. The ejectors transfer the sump contents to Plant Wash and Drain Vessel (RLD-VSL-00008).

### 5.1.3 Canister Decon Cave

There are three vessels located in the Canister Decon Cave (H-B035): Canister Decon Vessel 1 and 2 (HDH-VSL-00002 and HDH-VSL-00004) and Waste Neutralization Vessel (HDH-VSL-00003). Any leakages from the Canister Decon Vessel 1 (HDH-VSL-00002), Canister Decon Vessel 2 (HDH-VSL-00004), and Waste Neutralization Vessel (HDH-VSL-00003) flow into sump HDH-SUMP-00003 located in the Canister Decon Cave at -16 ft elevation. This sump is provided with level detector and an ejector. The ejector transfers the sump contents to Plant Wash and Drain Vessel (RLD-VSL-00008).

### 5.1.4 Canister Rinse Tunnel

The Rinse Tunnel Canister Rinse Vessel (HDH-VSL-00001) is located in the Canister Rinse Tunnel (H-B039B). The maximum volume that could be released into the room H-B039B upon vessel failure is 110 % of the maximum operating volume of Rinse Tunnel Canister Rinse Vessel. The Rinse Tunnel Canister Rinse-Bogie Maintenance Room and Canister Rinse Tunnel are interconnected and the flooding overflows from one room into the other room. Since the flood volume of the Canister Rinse-Bogie Maintenance Room is larger than Canister Rinse Tunnel, the flood volume of Canister Rinse-Bogie Maintenance Room is the postulated maximum flood volume for Canister Rinse Tunnel. Sump HDH-SUMP-00001 is located in this room at -16.5 ft elevation and is provided with level detector and an ejector. The ejector transfers the sump contents to Plant Wash and Drain Vessel (RLD-VSL-00008).

### 5.1.5 Canister Rinse-Bogie Maintenance Room

The Rinse Tunnel Canister Rinse Vessel (HDH-VSL-00001) could be moved on a bogie into the Canister Rinse Rinse-Bogie Maintenance Room (H-B039A). In the event of vessel failure, flooding could occur in the room. The maximum volume that could be released into the room H-B039A upon vessel failure is 110 % of the maximum operating volume of Rinse Tunnel Canister Rinse Vessel. Sump HDH-SUMP-00002 is located in this room at -16 ft elevation and is provided with level detector and a pump. The pump transfers the sump contents to Plant Wash and Drain Vessel (RLD-VSL-00008).

### **5.1.6 SBS Drain Collection Cell No 1**

SBS Condensate Receiver Vessel, HOP-VSL-00903 and sump HOP-SUMP-00003 are located in this cell (H-B021). Any leakage from the SBS Condensate Receiver Vessel (HOP-VSL-00903) flows into sump HOP-SUMP-00003. This sump also receives waste, through gravity floor drain from the secondary containment for the Melter 1 Submerged Bed Scrubber (SBS) and Melter 1 High Efficiency Mist Eliminators (HEMEs). This sump is located at -21 ft elevation and is provided with level detector and two ejectors. The ejectors transfer the sump contents to Plant Wash and Drain Vessel (RLD-VSL-00008).

### **5.1.7 SBS Drain Collection Cell No 2**

SBS Condensate Receiver Vessel, HOP-VSL-00904 and sump HOP-SUMP-00008 are located in this cell (H-B005). Any leakage from the SBS Condensate Receiver Vessel (HOP-VSL-00904) flows into sump HOP-SUMP-00008. This sump also receives waste, through gravity floor drain from the secondary containment for the Melter 2 SBS and Melter 2 HEMEs. This sump is located at -21 ft elevation and is provided with level detector and two ejectors. The ejectors transfer the sump contents to Plant Wash and Drain Vessel (RLD-VSL-00008).

## **5.2 Sumps Located at Elevation 0 Ft**

### **5.2.1 Sumps Located in the Melter Cave No 1**

Sump HFP-SUMP-00002 is located at 5 ft elevation in the south section of the cell (H-0117). If the capacity of the Melter 1 Feed Preparation Vessel (HFP-VSL-00001) or Melter 1 Feed Vessel (HFP-VSL-00002) is exceeded, the vessel overflows into this sump. Any leakages from these vessels also flow into this sump. The sump is provided with level detector and an ejector. The ejector transfers the sump contents to Plant Wash and Drain Vessel (RLD-VSL-00008).

### **5.2.2 Melter 1 Decontamination Pit**

Sump HSH-SUMP-00008 is located at 0 ft elevation in the Melter 1 Equipment Decontamination Pit (H-0310A). If the capacity of the Decontamination Tank Melter Cave 1 (HSH-TK-00001) is exceeded, the excess overflows into this sump. This sump is provided with level detector and an ejector. The ejector transfers the sump contents to Plant Wash and Drain Vessel (RLD-VSL-00008).

### **5.2.3 Sumps Located in the Melter Cave No 2**

Sump HFP-SUMP-00005 is located at 5 ft elevation in the south section of the cell (H-0106). If the capacity of the Melter 2 Feed Preparation Vessel (HFP-VSL-00005) or Melter 2 Feed Vessel (HFP-VSL-00006) is exceeded, the vessel overflows into this sump. Any leakages from these vessels also flow into this sump. This sump is provided with level detector and an ejector. The ejector transfers the sump contents to Plant Wash and Drain Vessel (RLD-VSL-00008).

### **5.2.4 Melter 2 Decontamination Pit**

Sump HSH-SUMP-00009 is located at 0 ft elevation in the Melter 2 Equipment Decontamination Pit (H-0304A). If the capacity of the Decontamination Tank Melter Cave 2 (HSH-TK-00002) is exceeded, the excess overflows into this sump. This sump is provided with level detector and an ejector. The ejector transfers the sump contents to Plant Wash and Drain Vessel (RLD-VSL-00008).

### 5.3 Sumps Located at Elevation 37 Ft

Sump HFP-SUMP-00001 is located at 37 ft elevation in the active service cell Melter 1 (H-0308). Any leakage from the Melter 1 wet electrostatic precipitator, HOP-WESP-00001, flows into this sump. Sump HFP-SUMP-00004 is located at 37 ft elevation in the active service cell Melter 2 (H-0302). Any leakage from the Melter 2 wet electrostatic precipitator, HOP-WESP-00002, flows into this sump. The leakages collected in these sumps drain by gravity into the Plant Wash and Drains Vessel (RLD-VSL-00008). If the maximum operating volume of the wet electrostatic precipitator were to leak into this sump, it would gravity drain into RLD-VSL-00008 in less than an hour. Therefore, the sumps HFP-SUMP-00001 and HFP-SUMP-00004 are not included in the below analysis.

### 5.4 Sumps and Pump/Ejectors Data

The sumps and pump/ejectors data are summarized in the following table.

Room No.	Sump Number	Ejector/ Pump Number	Ejector/Pump Design Flowrate (gpm)
H-B014	HCP-SUMP-00001	RLD-EJCTR-00049A/B	25
H-B014	RLD-SUMP-00001	RLD-EJCTR-00052A/B	25
H-B035	HDH-SUMP-00003	RLD-EJCTR-00054	25
H-B039B	HDH-SUMP-00001	RLD-EJCTR-00055	25
H-B039A	HDH-SUMP-00002	RLD-PMP-00023	25
H-B021	HOP-SUMP-00003	RLD-EJCTR-00053A/B	25
H-B005	HOP-SUMP-00008	RLD-EJCTR-00176A/B	25
H-0117	HFP-SUMP-00002	RLD-EJCTR-00172	25
H-0310A	HSH-SUMP-00008	RLD-EJCTR-00026	25
H-0106	HFP-SUMP-00005	RLD-EJCTR-00178	25
H-0304A	HSH-SUMP-00009	RLD-EJCTR-00173	25

## 6 Sump Removal Rates

The results of this evaluation are compiled in the following table based on calculations provided in Section 7.

### HLW Facility Waste Removal Capability Over 24 Hours

Containment Area Elevation (ft)	Containment Area Room Number	Sump Number	Sump Waste Removal Capacity, (US gal/h)	Largest Vessel in Containment Area (Vessel Number and Maximum Volume) <sup>1</sup>	Largest Vessel Waste Removal Capability, h	Fire Water Volume <sup>2</sup> , (US gal)	Fire Water Removal Capability, h	Total Flooding Volume, <sup>2</sup> including Design Allowance (US gal)	Total Containment Area Waste Removal Capability (h)
-21	H-B014 (South)	HCP-SUMP-00001	1,500	HCP-VSL-00001, 20,061 gal	13.4	Not Applicable	Not Applicable	21,064	14.0

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Containment Area Elevation (ft)	Containment Area Room Number	Sump Number	Sump Waste Removal Capacity, (US gal/h)	Largest Vessel in Containment Area (Vessel Number and Maximum Volume) <sup>1</sup>	Largest Vessel Waste Removal Capability, h	Fire Water Volume <sup>2</sup> , (US gal)	Fire Water Removal Capability, h	Total Flooding Volume, <sup>2</sup> including Design Allowance (US gal)	Total Containment Area Waste Removal Capability (h)
-21	H-B014 (North)	RLD-SUMP-00001	1,500	RLD-VSL-00002, 344 gal	0.2	Not Applicable	Not Applicable	359	0.2
-16	H-B035	HDH-SUMP-00003	1,500	HDH-VSL-00003, 5,356 gal	3.6	Not Applicable	Not Applicable	5,625	3.8
-16.5	H-B039B	HDH-SUMP-00001	1,500	HDH-VSL-00001, 3,949 gal	2.6	2,228	1.5	6,485	4.3
-16	H-B039A	HDH-SUMP-00002	1,500	HDH-VSL-00001, 3,949 gal	2.6	3,168	2.1	7,480	5.0
-21	H-B021	HOP-SUMP-00003	1,500	HOP-VSL-00903, 10,936gal	7.3	Not Applicable	Not Applicable	11,482	7.7
-21	H-B005	HOP-SUMP-00008	1,500	HOP-VSL-00904, 10,936gal	7.3	Not Applicable	Not Applicable	11,482	7.7
3	H-0117	HFP-SUMP-00002	1,500	HFP-VSL-00002, 8,512 gal	5.7	Not Applicable	Not Applicable	8,939	6.0
0	H-0310A	HSH-SUMP-00008	1,500	HSH-TK-00001, 4,361 gal	2.9	Not Applicable	Not Applicable	4,578	3.1
3	H-0106	HFP-SUMP-00005	1,500	HFP-VSL-00006, 8,512 gal	5.7	Not Applicable	Not Applicable	8,939	6.0
0	H-0304A	HSH-SUMP-00009	1,500	HSH-TK-00002, 4,361 gal	2.9	Not Applicable	Not Applicable	4,578	3.1

<sup>1</sup> 110 % of maximum operating volume or total volume of the vessel which ever is larger.

<sup>2</sup> Fire water volume and total volume derived from flooding volume reports (Ref. 3)

## 7 Bounding Calculations

Waste removal capability is estimated for eleven secondary containment areas with regulated plant items based on the bounding calculation presented in this section. The eleven secondary containment areas and their location in the HLW Facility are listed as follows:

1. Wet Process Cell - South (Room H-B014) / -21 Ft Elevation
2. Wet Process Cell - North (Room H-B014) / -21 Ft Elevation
3. Canister Decon Cave (Room H-B035) / -16 Ft Elevation
4. Canister Rinse Tunnel (Room H-B039B) / -16.5 Ft Elevation
5. Canister Rinse-Bogie Maintenance (Room H-B039A) / -16 Ft Elevation
6. SBS Drain Collection Cell No 1 (Room H-B021) / -21 Ft Elevation
7. SBS Drain Collection Cell No 2 (Room H-B005) / -21 Ft Elevation
8. Melter Cave No 1 - South (Room H-0117) / 3 Ft Elevation
9. Melter No 1 Equipment Decontamination Pit (Room H-0310A) / 0 Ft Elevation
10. Melter Cave No 2 - South (Room H-0106) / 3 Ft Elevation
11. Melter No 2 Equipment Decontamination Pit (Room H-0304A) / 0 Ft Elevation

### 7.1 Wet Process Cell - South (Room H-B014) / -21 Ft Elevation

The Wet Process Cell-South secondary containment area has one sump. The sump is provided with two 100 % capacity ejectors; only one of the two ejectors is operated for removing waste.

Flooding volume is derived from the flooding volume report (Reference 3) and is based on the total volume of the largest vessel within this containment area, which is one of the HLW Concentrate Receipt Vessels (HCP-VSL-00001/00002). It is to be noted that the HLW Concentrate Receipt Vessels are deleted from the design. However, for the purpose of this report, the vessels are left in for bounding flooding volume consideration. Fire sprinklers are not provided in this area, and there is no contribution from other areas in this regard. To account for other auxiliary components (piping and equipment) in the room, a design allowance of 5 % is applied to the flood volume.

Maximum flooding volume = 21,064 gal  
Ejector capacity = 25 gpm / ejector  
Ejector capacity = 25 gpm x 60 min/hr = 1,500 gal/hr

The waste removal capability is calculated by dividing the maximum flooding volume by the ejector capacity.

Waste removal capability = 21,064 gallons/1,500 gal/hr = 14.0 hours

### 7.2 Wet Process Cell - North (Room H-B014) / -21 Ft Elevation

The Wet Process Cell -North secondary containment area has one sump. The sump is provided with two 100 % capacity ejectors; only one of the two ejectors is operated for removing waste.

Flooding volume is derived from the flooding volume report (Reference 3) and is based on the total volume of Offgas Drain Collection Vessel (RLD-VSL-00002). Fire sprinklers are not provided in this area, and there is no contribution from other areas in this regard. To account for other auxiliary components (piping and equipment) in the room, a design allowance of 5 % is applied to the flood volume.

Maximum flooding volume = 359 gal  
Ejector capacity = 25 gpm / ejector  
Ejector capacity = 25 gpm x 60 min/hr = 1,500 gal/hr

The waste removal capability is calculated by dividing the maximum flooding volume by the ejector capacity.

Waste removal capability = 359 gallons/1,500 gal/hr = 0.2 hours

### 7.3 Canister Decon Cave (Room H-B035) / -16 Ft Elevation

The Canister Decon Cave secondary containment area has one sump provided with a single ejector.

Flooding volume is derived from the flooding volume report (Reference 3) and is based on 110 % of the maximum operating volume of the largest vessel in this area, which is Waste Neutralization Vessel

(HDH-VSL-00003). Fire sprinklers are not provided in this room. To account for other auxiliary components (piping and equipment) in the room, a design allowance of 5 % is applied to the flood volume.

110 % of the maximum operating volume of vessel = 5,356 gal  
Maximum flooding volume = 5,625 gal

Ejector capacity = 25 gpm  
Ejector capacity = 25 gpm x 60 min/hr = 1,500 gal/hr

The waste removal capability is calculated by dividing the maximum flooding volume by the ejector capacity.

Waste removal capability = 5,625 gallons/1,500 gal/hr = 3.8 hours

#### **7.4 Canister Rinse Tunnel (Room H-B039B) / -16.5 Ft Elevation**

The Canister Rinse Tunnel secondary containment area has one sump provided with a single ejector.

Flooding volume is derived from the flooding volume report (Reference 3) and is based on 110 % of the maximum operating volume of Rinse Tunnel Canister Rinse Vessel (HDH-VSL-00001). Fire sprinklers are provided in this area. To account for other auxiliary components (piping and equipment) in the room, a design allowance of 5 % is applied to the flood volume.

110 % of the maximum operating volume of vessel = 3,949 gal  
Fire water volume = 2,228 gal  
Maximum flooding volume = 6,485 gal

Ejector capacity = 25 gpm / ejector  
Ejector capacity = 25 gpm x 60 min/hr = 1,500 gal/hr

The waste removal capability is calculated by dividing the maximum flooding volume by the ejector capacity.

Waste removal capability = 6,485 gallons/1,500 gal/hr = 4.3 hours

#### **7.5 Canister Rinse-Bogie Maintenance (Room H-B039A) / -16 Ft Elevation**

The Canister Rinse-Bogie Maintenance secondary containment area has one sump provided with a single pump.

Flooding volume is derived from the flooding volume report (Reference 3) and is based on 110 % of the maximum operating volume of Rinse Tunnel Canister Rinse Vessel (HDH-VSL-00001). Fire sprinklers are provided in this area. To account for other auxiliary components (piping and equipment) in the room, a design allowance of 5 % is applied to the flood volume.

110 % of the maximum operating volume of vessel = 3,949 gal  
Fire water volume = 3,168 gal  
Maximum flooding volume = 7,480 gal

Pump capacity = 25 gpm

Pump capacity = 25 gpm x 60 min/hr = 1,500 gal/hr

The waste removal capability is calculated by dividing the maximum flooding volume by the pump capacity.

Waste removal capability = 7,480 gallons/1,500 gal/hr = 5 hours

## 7.6 SBS Drain Collection Cell No 1 (Room H-B021) / -21 Ft Elevation

The SBS Drain Collection Cell No 1 secondary containment area has one sump. The sump is provided with two 100 % capacity ejectors; only one of the two ejectors is operated for removing waste.

Flooding volume is derived from the flooding volume report (Reference 3) and is based on 110 % of the maximum operating volume of SBS Condensate Receiver Vessel (HOP- VSL-00903). Fire sprinklers are not provided in this area, and there is no contribution from other areas in this regard. To account for other auxiliary components (piping and equipment) in the room, a design allowance of 5 % is applied to the flood volume.

110 % of the maximum operating volume of vessel = 10,936 gal

Maximum flooding volume = 11,482 gal

Ejector capacity = 25 gpm / ejector

Ejector capacity = 25 gpm x 60 min/hr = 1,500 gal/hr

The waste removal capability is calculated by dividing the maximum flooding volume by the ejector capacity.

Waste removal capability = 11,482 gallons/1,500 gal/hr = 7.7 hours

## 7.7 SBS Drain Collection Cell No 2 (Room H-B005) / -21 Ft Elevation

The SBS Drain Collection Cell No 2 secondary containment area has one sump. The sump is provided with two 100 % capacity ejectors; only one of the two ejectors is operated for removing waste.

Flooding volume is derived from the flooding volume report (Reference 3) and is based on 110 % of the maximum operating volume of SBS Condensate Receiver Vessel (HOP- VSL-00904). Fire sprinklers are not provided in this area, and there is no contribution from other areas in this regard. To account for other auxiliary components (piping and equipment) in the room, a design allowance of 5 % is applied to the flood volume.

110 % of the maximum operating volume of vessel = 10,936 gal

Maximum flooding volume = 11,482 gal

Ejector capacity = 25 gpm / ejector

Ejector capacity = 25 gpm x 60 min/hr = 1,500 gal/hr

The waste removal capability is calculated by dividing the maximum flooding volume by the ejector capacity.

Waste removal capability = 11,482 gallons/1,500 gal/hr = 7.7 hours



### 7.8 Melter Cave No 1 (Room H-0117) / 3 Ft Elevation

The Melter Cave No 1 (south) secondary containment area has one sump provided with a single ejector.

Flooding volume is derived from the flooding volume report (Reference 3) and is based on 110 % of the maximum operating volume of the largest vessel in this area, which is Melter 1 Feed Vessel (HFP-VSL-00002). Fire sprinklers are not provided in this room. To account for other auxiliary components (piping and equipment) in the room, a design allowance of 5 % is applied to the flood volume.

110 % of the maximum operating volume of vessel = 8,512 gal  
Maximum flooding volume = 8,939 gal

Ejector capacity = 25 gpm  
Ejector capacity = 25 gpm x 60 min/hr = 1,500 gal/hr

The waste removal capability is calculated by dividing the maximum flooding volume by the ejector capacity.

Waste removal capability = 8,939 gallons/1,500 gal/hr = 6.0 hours

### 7.9 Melter 1 Equipment Decontamination Pit (Room H-0310A) / 0 Ft Elevation

The Melter 1 Equipment Decontamination Pit secondary containment area has one sump provided with a single ejector.

Flooding volume is derived from the flooding volume report (Reference 3) and is based on 110 % of the maximum operating volume of the largest vessel in this area, which is Decontamination Tank Melter Cave No 1 (HSH-TK-00001). Fire sprinklers are not provided in this room. To account for other auxiliary components (piping and equipment) in the room, a design allowance of 5 % is applied to the flood volume.

110 % of the maximum operating volume of tank = 4,361 gal  
Maximum flooding volume = 4,578 gal

Ejector capacity = 25 gpm  
Ejector capacity = 25 gpm x 60 min/hr = 1,500 gal/hr

The waste removal capability is calculated by dividing the maximum flooding volume by the ejector capacity.

Waste removal capability = 4,578 gallons/1,500 gal/hr = 3.1 hours

### 7.10 Melter Cave No 2 (Room H-0106) / 3 Ft Elevation

The Melter Cave No 2 (south) secondary containment area has one sump provided with a single ejector.

Flooding volume is derived from the flooding volume report (Reference 3) and is based on 110 % of the maximum operating volume of the largest vessel in this area, which is Melter 2 Feed Vessel (HFP-VSL-

00006). Fire sprinklers are not provided in this room. To account for other auxiliary components (piping and equipment) in the room, a design allowance of 5 % is applied to the flood volume.

110 % of the maximum operating volume of vessel = 8,512 gal

Maximum flooding volume = 8,939 gal

Ejector capacity = 25 gpm

Ejector capacity = 25 gpm x 60 min/hr = 1,500 gal/hr

The waste removal capability is calculated by dividing the maximum flooding volume by the ejector capacity.

Waste removal capability = 8,939 gallons/1,500 gal/hr = 6.0 hours

### 7.11 Melter 2 Equipment Decontamination Pit (Room H-0304A) / 0 Ft Elevation

The Melter 2 Equipment Decontamination Pit secondary containment area has one sump provided with a single ejector.

Flooding volume is derived from the flooding volume report (Reference 3) and is based on 110 % of the maximum operating volume of the largest vessel in this area, which is Decontamination Tank Melter Cave 2 (HSH-TK-00001). Fire sprinklers are not provided in this room. To account for other auxiliary components (piping and equipment) in the room, a design allowance of 5 % is applied to the flood volume.

110 % of the maximum operating volume of tank = 4,361 gal

Maximum flooding volume = 4,578 gal

Ejector capacity = 25 gpm

Ejector capacity = 25 gpm x 60 min/hr = 1,500 gal/hr

The waste removal capability is calculated by dividing the maximum flooding volume by the ejector capacity.

Waste removal capability = 4,578 gallons/1,500 gal/hr = 3.1 hours

## 8 References

1. WAC 173-303, *Dangerous Waste Regulations*, Washington Administrative Code.
2. Dangerous Waste Permit, Permit Number WA7890008967, *Dangerous Waste Portion of the Hanford Facility Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of dangerous waste*, Chapter 10 and Attachment 51, "Waste Treatment and Immobilization Plant".
3. 24590-HLW-PER-M-02-003, Rev.3, *Flooding Volume for the HLW Facility*, August 3, 2004.
4. 24590-HLW-PER-M-02-001, Rev.3, *HLW Facility Sump Data*, August 3, 2004.